CLAIMS

What is claimed:

1. A method for grafting a graft vessel to a target vessel during an anastomosis procedure, the method comprising:

forming an incision in the target vessel;

placing incision tensioners within the incision in the target vessel;

tensioning the incision in the target vessel with the incision tensioners; and

grafting the graft vessel to the target vessel while the incision is tensioned.

2. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners are pins.

3. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners are hooks.

4. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners include a cutting surface configured to form the incision within the target vessel.

5. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners are sutures.

6. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners each include a balloon assembly configured to provide tension on the incision in the target vessel.

7. A method for grafting a graft vessel to a target vessel as recited in Claim 6, wherein the balloon assemblies each include a balloon.

8. A method for grafting a graft vessel to a target vessel as recited in Claim 7, wherein each balloon is uninflated prior to placement within the target vessel.

9. A method for grafting a graft vessel to a target vessel as recited in Claim 8, the method further comprising:

inflating the balloon after the balloon is inserted within the target vessel; and

tensioning the incision by pulling the balloon assemblies away from one another.

10. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision is tensioned to a predetermined length which corresponds to a size of the graft vessel to be grafted to the target vessel during the anastomosis procedure.

11. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the operation of tensioning the incision in the target vessel further comprises:

pulling the incision tensioners with a predetermined force.

12. A method for grafting a graft vessel to a target vessel as recited in Claim 11, wherein the predetermined force is in a range of about .001 N to about 4.5 N.

13. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioners are clips which include a first tine and a second tine.

14. A method for grafting a graft vessel to a target vessel as recited in Claim 13, wherein both the first tine and the second tine are configured to penetrate both the graft vessel and the target vessel.

15 . A method for grafting a graft vessel to a target vessel as recited in Claim 14, wherein both the first tine and the second tine are configured to rotate such that the first tine and the second tine capture the graft vessel and the target vessel.

16. A method for grafting a graft vessel to a target vessel as recited in Claim 14, wherein both the first tine and the second tine are configured to fold over such that the first tine and the second tine capture the graft vessel and the target vessel.

17. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the incision tensioner is an anvil configured to tension the incision in the target vessel.

18. A method for grafting a graft vessel to a target vessel as recited in Claim 1, wherein the tensioning of the incision allows a geometry of the incision in the target vessel to remain constant during the anastomosis procedure.

19. A method for forming an incision in a target vessel for an anastomosis procedure, the method comprising:

inserting a first incision tensioner and a second incision tensioner through a wall of the target vessel; and

separating the first incision tensioner from the second incision tensioner to tension an incision in the target vessel.

20. A method for forming an incision in a target vessel as recited in Claim 19, wherein the incision tensioners remain in the incision in the target vessel during the anastomosis procedure to maintain a known geometry of the incision.

21. A method for forming an incision in a target vessel as recited in Claim 20, wherein the known geometry allows the incision in the target to vessel to remain constant during the anastomosis procedure.

22. A method for forming an incision in a target vessel as recited in Claim 19, wherein the second incision tensioner includes a cutting surface configured to form the incision in the target vessel.

23 A method for forming an incision in a target vessel as recited in Claim 19, wherein the incision tensioners are pins.

24. A method for forming an incision in a target vessel as recited in Claim 19, wherein the incision tensioners are hooks.

25. A method for forming an incision in a target vessel as recited in Claim 19, wherein the incision tensioners form an incision having a predetermined length which corresponds to a size of a graft vessel to be grafted to the target vessel during the anastomosis procedure.

26. A system for aligning a graft vessel to a target vessel having an incision formed therein, the system comprising:

first and second incision tensioners configured for placement within the incision of the target vessel, where the incision tensioners are configured to tension the incision to a predetermined length having a known geometry;

a tensioning device body connected to the incision tensioners; and

a tensioning mechanism for moving the first incision tensioner with respect to the second incision tensioner.

27. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the tensioning mechanism includes a tension spring for moving the first incision tensioner with respect to the second incision tensioner.

28. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the tensioning mechanism includes a threaded assembly for moving the first incision tensioner with respect to the second incision tensioner.

29. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners are configured to form the incision of the target vessel.

30. A system for aligning a graft vessel to a target vessel as recited in Claim 29, wherein the first incision tensioner includes a cutting surface configured to form the incision.

31. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the predetermined length corresponds to a size of the graft vessel to be grafted to the target vessel during the anastomosis procedure.

32. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners are hooks.

33. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners are pins.

34. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners are sutures.

35. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners each include a balloon assembly configured to tension the incision of the target vessel.

36. A system for aligning a graft vessel to a target vessel as recited in Claim 35, wherein the balloon assemblies each include a balloon.

37. A system for aligning a graft vessel to a target vessel as recited in Claim 36, wherein each balloon is uninflated prior to placement within the target vessel.

38. A system for aligning a graft vessel to a target vessel as recited in Claim 37, wherein the balloon is inflated after the balloon is placed within the incision.

39. A system for aligning a graft vessel to a target vessel as recited in Claim 38, wherein the tensioning mechanism moves the first incision tensioner with respect to the second incision tensioner after each of the balloons are inflated.

40. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the tensioning mechanism moves the first incision tensioner with respect to the second incision tensioner using a predetermined force.

41. A system for aligning a graft vessel to a target vessel as recited in Claim 40, wherein the predetermined force is in a range of about .001 N to about 4.5 N.

42. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners are incision tensioner clips which includes a first tine and a second tine.

43. A system for aligning a graft vessel to a target vessel as recited in Claim 42, wherein both the first tine and the second tine are configured to penetrate the graft vessel and the target vessel.

44. A system for aligning a graft vessel to a target vessel as recited in Claim 43, wherein both the first tine and the second tine are configured to rotate such that the first tine and the second tine capture the graft vessel and the target vessel.

45. A system for aligning a graft vessel to a target vessel as recited in Claim 43, wherein both the first tine and the second tine are configured to fold over such that the first tine and the second tine capture the graft vessel and the target vessel.

46. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the incision tensioners maintain the known geometry of the incision during an anastomosis procedure.

47. A system for aligning a graft vessel to a target vessel as recited in Claim 26, wherein the known geometry allows the incision in the target to vessel to remain constant during the anastomosis procedure.

48. A tension control device for aligning a graft vessel to a target vessel having an incision formed therein during an anastomosis procedure, the tension control device comprising a first tensioner slidably coupled with a second tensioner, where the tensioners are configured to tension the incision formed in the target vessel with a predetermined force imparted to the tensioners with a force applying mechanism.

49. A tension control device as recited in Claim 48, wherein the tension control device forms the incision in the target vessel to a known geometry.

50. A tension control device as recited in Claim 49, wherein the known geometry allows the incision in the target to vessel to remain constant during the anastomosis procedure.

51. A tension control device as recited in Claim 48, wherein the force applying mechanism is a spring.

52. A tension control device as recited in Claim 48, wherein the first tensioner couples with the second tensioner using a notch.

53. A tension control device as recited in Claim 48, wherein the first tensioner and the second tensioner include removable portions in order to facilitate grafting of the graft vessel to the target vessel during the anastomosis procedure.